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ABSTRACT

The Multidimensional Motivation Instrument and the Classroom Environment Scale were used to examine the effects of the variables motivation (achievement motivation, academic self-concept, social self-concept, and emotional self-concept) and the classroom learning environment (involvement, affiliation, teacher support, task orientation, order and organization, and rule clarity) on the verbal and mathematics Scholastic Aptitude Test (SAT) scores of approximately 300 black high school seniors. The students took the SAT during the fall of the 1989-90 school year. Also studied were the effects of ability and sex on SAT scores. Multiple regression indicated that the motivation variable academic self-concept had significant positive effects on verbal and mathematics scores, but no other motivation variable had significant effects. The classroom learning variable order and organization had a significant positive effect on mathematics scores, but no other classroom variable had significant effects. Ability had the strongest positive effects on verbal and mathematics scores, while sex had a significant inverse effect on mathematics scores. Several significant sex differences were found for involvement, affiliation, and social self-concept. Results suggest a need for more systematic examinations of the achievement of black students in verbal and mathematics areas. One figure and 3 tables present study data, and there is a 59-item list of references. (SLD)

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The Effects of Motivation and the Classroom Learning Environment on Black Secondary Students' Verbal and Mathematics SAT Scores

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ABSTRACT

The **Multidimensional Motivation Instrument and the Classroom Environment Scale** were utilized to examine the effects of the variables Motivation (Achievement Motivation, Academic Self-Concept, Social Self-Concept, and Emotional Self-Concept) and the Classroom Learning Environment (Involvement, Affiliation, Teacher Support, Task Orientation, Order and Organization, and Rule Clarity) on a group of black secondary Grade 12 students' Verbal and Mathematics SAT scores. The study also examined the effects of the variables Ability and Sex on the group of students' Verbal and Mathematics SAT scores. The students' verbal and mathematics scores obtained on the Metropolitan Achievement Test, Form 6, while they were in Grade 9 were used to assess their ability. Approximately 300 black secondary students participated in the study.

The results of the multiple regression equations revealed that the motivation variable Academic Self-Concept had significant, positive effects on the Verbal and Mathematics SAT scores. Not one of the other motivation variables had significant effects on the Verbal and Mathematics SAT scores. The classroom learning environment variable Order and Organization revealed a significant, positive effect on the Mathematics SAT scores. Not one of the other classroom learning environment variables indicated significant effects on the Verbal nor on the Mathematics SAT scores. The variable Ability suggested strong significant, positive effects on the Verbal SAT scores and on the Mathematics SAT scores. The variable Sex indicated a significant, inverse effect on the Mathematics SAT scores.

The results of the regression of the independent variables by sex on the Verbal and Mathematics SAT scores revealed several significant sex differences. The variable Involvement, for example, favored females on the Verbal and the Mathematics SAT scores. The variable Affiliation inversely favored females on the Mathematics SAT scores. The variable Social Self-Concept significantly, positively favored males on the Verbal SAT scores.

Of all the variables examined for effects on the particular group of black students' Verbal and Mathematics SAT scores, the variable Ability revealed the strongest significant, positive effect on the Verbal SAT scores and on the Mathematics SAT scores. The results of the present study suggest a need for more systematic examinations of black students' verbal and mathematics achievement similar to the verbal and mathematics skills included on the SAT to help them improve their performance on the SAT. Thus, further research on the variables investigated in the present study is recommended.

In the past two and a half decades, there has been a decline in secondary students' scores on the Scholastic Aptitude Test (SAT) which has caused great concern about the quality of education students are receiving (Brown, 1987; McGeever, 1983), especially black secondary students. Comparatively, black secondary school students' average Verbal SAT score of 352 is 90 points and 72 points below the Verbal SAT average of white secondary students and of the nation (442, 424), respectively. Black students' Mathematics SAT average of 385 is lagging 106 points behind white secondary students' Mathematics SAT average of 491 and 91 points below the national Mathematics SAT average of 476 (College Board, 1990). Although the SAT is an aptitude test, its assessment of verbal and mathematics skills is an indicator of students' achievement by the senior level in high school for which black students are demonstrating deficiencies. The gains black students have shown on the SAT over the past ten years have not been substantial enough to equalize their scores (Alderman & Powers, 1980; Kulik, Bangert, & Kulik, 1982; Messck & Jungeblut, 1981; Powers & Alderman, 1983) and even less effective on black students' Verbal SAT scores (Zuman, 1988).

Theoretical Framework

One area of research which has implications for improving black students' performance on the SAT is that of students' perceptions of various aspects of the self. Recent studies have viewed various self-perceptions as dimensions of motivation and have begun to investigate the critical impact that these self-perceptions have on academic achievement (Urguroglu & Walberg, 1979, 1986). This research implies that improvement in students' academic achievement may be enhanced by examining how students perceive various aspects of the self in their pursuance of academic goals. Black students, in particular, often do not perceive themselves as academically successful (Graham, 1988; Graham & Long, 1986). Students' self-concept exerts a positive influence on their academic achievement (Hansford & Hattie, 1982), especially their self-perceptions of ability (Dweck, 1986). Therefore, motivation involving the various perceptions of the self

in learning may be more effective on black students' SAT scores than curriculum-based instructions.

Students' perceptions of the classroom learning environment also have implications for improving black secondary students' SAT scores. This is predicated on the assumption that students' academic achievement can be improved by assessing the way they view or interpret their classroom environments since the consensus of the students characterizing the classroom is more substantial than rating by observers (Berliner, 1983; Fraser & Fisher, 1982; Moos, 1979; Moos & Trickett, 1974). Subsequently, establishing and maintaining an effective classroom learning environment has been proposed as a critical factor in improving black students' academic achievement (Walberg, 1984; Wang, 1988). Several studies have found that black students have less opportunity to learn in their classroom than majority students (Murphy, Hallinger, & Lotto, 1986; Murphy & Hallinger, 1986).

Motivation and the classroom learning environment have encouraging effects on academic achievement yet, there have been a limited number of studies that have assessed their influence on verbal and mathematics achievement and a very few studies that have focused specifically on the effects of motivation and the classroom learning environment on black students' Verbal and Mathematics SAT scores. The issue of black students' performance on the SAT must be addressed and variables that may be utilized to improve their performance need to be examined. Consequently, the objective of the present study is the examine the effects of motivation and the classroom learning environment on black secondary students' SAT scores.

Statement of the Problem

Although several research studies have focused on improvement of verbal and mathematics achievement similar to the verbal and mathematics skills included on the SAT, very few studies have focused directly on how to improve students' Verbal and Mathematics SAT scores. Studies have reported significant effects of motivation and the

classroom learning environment on students' verbal and mathematics achievement, yet studies have not actually investigated whether these same variables can be used to increase students' Verbal and Mathematics SAT scores. There is still a lack of studies on whether variables such as motivation and the classroom learning environment can be manipulated to help students successfully master the verbal skills (verbal reasoning, vocabulary, and reading comprehension) and mathematics concepts (problem solving in arithmetic, elementary algebra, and geometry) that are assessed on the SAT, particularly black students.

At least 70 questions of the 85 questions on the Verbal SAT component measure competency on antonyms, analogies, and reading passages. For these academic skills, students' self-perceptions of themselves and of their classroom learning environment have proven most successful. Therefore, these variables may have similar effects on the dimensions on the SAT. Furthermore, since the variables (students' motivation and the classroom learning environment) have been found alterable, perhaps they can be utilized to improve black students' performance on the SAT.

Interestingly, the apparent lag of black secondary students' SAT scores behind white students' SAT scores has received much attention, but relatively few efforts have concentrated on how to help these students improve their SAT scores. Therefore, the issue of black secondary students' performance on the SAT must be addressed, and the variables that have been found to significantly influence verbal and mathematics achievement need to be examined for similar effects on SAT scores. The challenge incumbent on educators is to determine whether these same variables are significantly related to SAT scores as they seek to increase these black students' performance on the SAT.

Purpose

Despite the increasing concern about black secondary students' low performance on the SAT, very little attention has been given to educational interventions that may be used to increase the scores. Although the SAT is not a direct measure of what students have

learned from classroom instruction, it does measure students' competency on some basic verbal and mathematics skills which they should have accomplished by their senior year in high school such as reading comprehension, vocabulary, verbal reasoning; problem solving in arithmetic, elementary algebra, and in geometry (Turnbull, 1985). Students' performance on the preceding verbal and mathematical skills are useful in assessing the academic preparation of students completing secondary schools. Motivation and the classroom learning environment have exhibited remarkable improvements on verbal and mathematics achievement in various academic areas.

Therefore, the purpose of the present study is to examine the effects of motivation and the classroom learning environment on black students' Verbal and Mathematics SAT scores. More specifically, do motivation and the classroom learning environment significantly affect black students' performance on the verbal skills (reading comprehension, vocabulary, and verbal reasoning) that are assessed on the Verbal SAT component and on the mathematical skills (problem solving in arithmetic, elementary Algebra and geometry) that are included on the Mathematics section of the SAT? Secondly, the study will determine whether students' ability as measured by their performance on the Verbal and Mathematics components of the Metropolitan Achievement Test, Form 6 (MAT6) significantly impact Verbal and Mathematics SAT scores. Also, due to the wide difference in the performance of males and females on mathematics and verbal achievement, the present study will compare males and females on the Verbal and Mathematics SAT scores.

Research Questions

The literature has revealed that students' motivation and the classroom learning environment have consistently been found to enhance students' verbal and mathematics achievement. This study will, therefore, investigate the following questions:

1. What are the effects of motivation and the classroom learning environment on black secondary students' Verbal and Mathematics SAT scores?

2. Are there differential effects by students' ability and sex on the Verbal and Mathematics SAT scores?

Review of the Literature

A review of the literature has revealed that motivation increases students' academic performance on verbal and mathematics measures. Catell, Barton, and Dielman (1972), for example, found that motivation accounted for 20% to 25% of the variance in school achievement, especially mathematics, science, social studies, and reading. Lekarczyk and Hull (1969) correlated the self-concept dimension of motivation and verbal learning. The findings showed that self-concept was positively related to the performance of males on verbal achievement but not to the verbal performance of females. Uguroglu, Schiller, and Walberg (1981) concluded that motivation was significantly related to vocabulary, reading comprehension, mathematics comprehension, and mathematics concepts of a group of students Grades 3 through 8. The results of a meta-analysis revealed similar findings for a group of students Grades 5 through 8 (Uguroglu & Walberg, 1986).

In 1981, Uguroglu, Schiller, and Walberg examined the effects of several motivational variables on students' reading achievement. The results showed achievement motivation, academic self-concept, social self-concept, and emotional self-concept to be significantly related to vocabulary and reading comprehension of a group of third- thru eighth-grade students. Uguroglu and Walberg (1986) conducted a similar study on the relationship between motivation and reading achievement of students Grades 5 through 8 and concluded that motivation was strongly related to this particular group of students' reading achievement, also.

Graham (1988) states that the self is an important aspect of academic achievement, especially of the black minority. Caplin (1968) found a high correlation between black students' scores on a self-report instrument involving self-concept and their scores on the reading component of the Iowa Test of Basic Skills. The results revealed that students who had higher scores on the self-concept questionnaire also had higher scores on reading

achievement. The results showed a correlation of .52 between self-concept scores and scores on reading. Fransson (1977) points out that motivation increases reading comprehension by influencing the level at which information is processed and recalled.

A significant, positive correlation between motivation and scores on the reading section of the Stanford Achievement Test was found. A positive relationship between motivation and reading was also found on the New York State Reading and Mathematics Achievement Test, another standardized test. In fact, high correlations were reported between motivation and reading achievement on both of the preceding standardized tests (Simon & Simon, 1975).

In addition to reading, Simon and Simon (1975) also found a similar strong relationship between motivation and students' scores on the mathematical section of the Stanford Achievement Test. A positive relationship was further indicated between motivation and scores on the mathematics component of the New York Reading and Mathematics Test. Brookover and Thomas (1964) examined a group of seventh-grade underachieving students on self-concept and school achievement. A significant, positive, relationship was found between motivation and grade point averages. The strength of the relationship persisted even when measured intelligence was controlled.

Focusing specifically on the relationship between motivation and mathematics achievement as related to black students, Caplin (1968) compared a group of black students' scores on a motivational questionnaire with their mathematics scores obtained on the Iowa Test of Basic Skills. Findings suggested that the students' scores on the motivational questionnaire and their scores on the mathematics section of the Iowa Test of Basic Skills were highly related. In a related study, similar groups of black students ad white students were compared on their perceptions of ability determined from feedback received on a mathematics test. Students were instructed to rate their mathematics performance from the results received. Black students rated themselves higher on mathematics achievement than did white students. This finding suggested that black

students' self-perceptions were higher regarding mathematics achievement than those of white students (Graham & Long, 1986).

In 1981, Uguroglu, Schiller, and Walberg found a significant relationship between motivation and comprehension of mathematics concepts of students in Grades 3 through 8. Catell, Barton, and Dielman (1972) reported that motivation independently and significantly predicted achievement in mathematics. Uguroglu and Walberg (1986) concluded that motivation was a strong predictor of mathematics achievement. These strong relationships between motivation and mathematics achievement are similar to those found on verbal achievement. Therefore, it is concluded that motivation, apparently, significantly affects students verbal and mathematics achievement.

Significant results have further been reported for the influence of the classroom learning environment on verbal and mathematics achievement. Kurt and Kenny (1986) state that a supportive classroom environment improves arithmetic reasoning. Alschuler (1969) compared student-involvement and teacher-control types of classroom environment on the Stanford Achievement Test. The results clearly evidenced that students in the student-involvement type of classroom environment performed significantly better on the Stanford Achievement Test than their counterparts. Frierson (1986) states that a supportive classroom environment definitely increases black students' academic performance.

Method

Subjects

The subjects participating in this study consisted of 300 12th-grade black students ranging from 17 to 19 years of age. The students represented six secondary high schools in a large metropolitan school district located in the Southwestern Region of the United States. A profile of the schools is found in Figure 1.

Black students represented 79% of the students in School 1, 89.6% in School 2, 49.9% in School 3, 97.3% in School 4, 76.5% in School 5, and 87.4% in School 6. The number of students that graduated from these school ranged from 85.7% to 97.8%. Most

of the schools had more male students than female students and more students at the Grade 9 level and the least number of students at the Grade 12 level. Approximately 50% or more of the students at four of the schools pursued college (Schools 1, 2, 3, and 6). At school 4, out of 1960 students enrolled, only 27% entered college. At school 5, 43% of the students pursued college. At four of the schools, over 10% of the students were considered "at risk" while at the remaining two schools, 2% to 5% of the students were characterized as "at risk."

The students in the sample took the SAT during the fall of the 1989-1990 school year. The SAT was administered October, 1989; November, 1989; December 1989; and January, 1990. The SAT administered in January, 1990 was taken before the end of the first semester. Therefore, it was considered as taken in the fall school term.

Instruments

Two self-report standardized instruments were used in the present study: (a) the Multidimensional Motivation Instrument (Uguroglu, Schiller, & Walberg, 1981), and (b) the Classroom Environment Scale (CES) (Fraser, 1982, 1986a; Fraser & Fisher, 1983c). the instruments were slightly modified so that the items would represent overall student achievement rather than subject-specific achievement. The Multidimensional Motivation Instrument (Uguroglu, Schiller, & Walberg, 1981) is a questionnaire that measures the motivation constructs of Achievement Motivation, Academic Self-Concept, Social Self-Concept, and Emotional Self-Concept and requires approximately 5 minutes to complete. The responses are on a 5-point Likert scale. The Multidimensional Motivation instrument has been found to have test-retest reliability and construct and predictive validity. Employing the Kuder-Richardson Formula-20, the internal reliability coefficient is .91. A brief description of the Multidimensional Movtivation scales follows:

Achievement Motivation - extent to which students feel that their performance in school is a direct result of their own effort and prior planning.

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Achievement Motivation - extent to which students feel that their performance in school is a direct result of their own effort and prior planning.

Academic Self-Concept - extent to which students exhibit pride in their school work and expect to do well in school.

Social Self-Concept - extent to which students think their teacher is pleased with them.

Emotional Self-Concept - extent to which students handle problems at home.

The Classroom Environment Scale (Fraser, 1982, 1986a; Fraser & Fisher, 1983c) is designed to assess the psychosocial environment of the classroom. It focuses on teacher-student and student-student relationships and on the organizational structure of the classroom. The CES contains six scales: (a) Involvement, (b) Affiliation, (c) Teacher Support, (d) Task Orientation, (e) Order and Organization, and (f) Rule Clarity. Students responded to the statements by circling either True or False. Content and concurrent validity have been established through correlations studies and classroom observations (Fraser 1982, 1986b). An internal reliability coefficient of 90 was obtained from the Kuder-Richardson Formula-20 for the present study. A brief description of the scale follows:

Involvement - extent to which students participate actively and attentively in class activities.

Affiliation - extent to which students know, help, and are friendly toward each other.

Teacher Support - extent to which teachers help students and take a personal interest in them.

Task Orientation - extent to which the class is business-like with an emphasis on completing class work.

Order and Organization - extent to which the class is under control with orderly behavior.

Rule Clarity - extent to which the rules are clearly stated and students are aware of the consequences of breaking rules.

The SAT was utilized to determine students' Verbal (antonyms, analogies, sentence completions, and reading passages) and Mathematics (arithmetic, elementary algebra, and geometry) SAT scores. The SAT was the most recent form administered during fall, 1989. The reliability range for the Verbal SAT component was approximately .89 to .90, and the range of reliability for the Mathematics SAT component was .87 to .89. There was no specific validity indicated since it is, in most situations, determined by the various admission criteria of colleges.

The Metropolitan Achievement Test 6 (MAT6) Advanced 1, Form M, that was taken during the spring, 1987 while the students were in Grade 9 was employed to assess students' ability on verbal dimensions (reading comprehension and vocabulary) and in mathematics (concepts, problem-solving, and computation). However, the MAT6 was statistically controlled for students' prior achievement. The reliability of the MAT6 ranges from .87 to .95 while the validity ranges from .60 to .85.

Near the end of the first semester of the 1989-1990 school year, all students completed the two instruments which were distributed and administered concurrently by the homeroom teachers. Students were informed by the homeroom teacher that the questionnaires were not tests and would not be viewed by their teachers, and they were instructed to write their student identification (ID) number, the name of their school, and their sex on the questionnaires. The questionnaires required approximately 5 minutes each to complete and were completed during a 25-minute homeroom period. The questionnaires were collected immediately following completion by a student representative and then secured in large envelopes. Envelopes were taken to the Grade 12 counselors immediately following the homeroom period and then collected by the researcher.

The students' ID numbers were obtained from their school records in the counselors' offices and matched with their names, MAT6 scores, and SAT scores.

Students who had not taken the MAT6, who had completed only one section of the MAT6 (Verbal only or Mathematics only), or who had not taken the SAT during the 1989-1990 Fall semester were omitted from the list. Of approximately 450 surveys that were administered and collected, 50 of the surveys did not meet the criteria and were eliminated. The 400 remaining surveys were assigned numbers 001 thru 400 and 300 were randomly selected. The six schools were randomly assigned numbers 1 thru 6.

Data Analysis

The statements on the instruments that were stated negatively were recorded. Descriptive statistics were employed to describe the means and standard deviations of the data. Next, Pearson's product-moment coefficients were computed to examine the relationships among the variables. Multiple regression analyses were employed to determine the effects of each of the 12 independent variables (Involvement, Affiliation, Teacher Support, Task Orientation, Order and Organization, Rule Clarity of the Classroom Environment Scales; Achievement Motivation, Academic Self-Concept, Social Self-Concept and Emotional Self-Concept of the Motivation Scale; Ability; and sex) on each of the two dependent variables (Verbal SAT scores and Mathematics SAT scores). Ability was determined from the reading and mathematics sections of the MAT6 and was statistically controlled for initial achievement.

Separate multiple regression equations were developed for each of the two dependent variables Verbal SAT scores and Mathematics SAT scores. The coefficient R-Square (R2) was utilized to explain the proportion of variance accounted for in each of the dependent variables by a combination of all the independent variables. A setwise regression was performed to examine all of the independent variables at the same time for effects on each of the two dependent variables. In the setwise regression, Beta weights were employed to explain the magnitude of the effect of each independent variable, while the other independent variables were held constant, on each of the dependent variables. Since the Beta weights are in standard score form and on an absolute scale, the magnitude

of the Beta weights correspond to the strength of the effect of each independent variable one each of the dependent variables.

Tolerance was computed to determine the extent of multicollinearity in each equation. The tolerance value for each independent variable in each of the two regression equations suggested that there were negligible multicollinearity problems. Subsequently, all of the independent variables were included in the regression model.

An examination of the effects of the variable Sex on the Verbal SAT scores and on the Mathematics SAT scores indicated significant sex differences on the Mathematics SAT scores. Since this sex difference was found, separate regression equations for males and females on the Verbal SAT scores and on the Mathematics SAT scores were also computed. These equations were designed to examine further the effects of the independent variables by sex on the dependent variables Verbal SAT scores and Mathematics SAT scores. Beta weights were considered in determining the magnitude of the effects.

Results

Data were collected on all scales of the two standardized instruments used in the present study: (a) the Multidimensional Motivation Instrument and the (b) Classroom Environment Survey. Table 1 reports the results of the means, standard deviations, and correlations for the variables on the Multidimensional Motivation Instrument and for the variables on the Classroom Environment Survey. As is shown, the variable Academic Self-Concept had the highest mean (3.67) while the variable Emotional Self-Concept indicated the lowest mean (3.22) on the motivation scale (on a five-point, Likert-type scale with five being the highest possible value). Affiliation had the highest mean (2.52) and Involvement the lowest mean (1.74) on the classroom scale (on a three-point scale with three being the highest possible value).

The results of the correlations, as stated previously, are also displayed in Table 1. The variable Academic Self-Concept, on the motivation scale, revealed the strongest

correlation with the Verbal SAT scores and with the Mathematics SAT scores (r=.54, p<.05; r=.55, p<.05), respectively, excluding ability. The variable Order, and Organization on the Classroom Environment Survey indicated the strongest correlation, excluding the variable Ability, with the Verbal SAT scores and with the Mathematics SAT scores (r=.36, p<.05; r=.38, p<.05), respectively.

The first research question addressed the effects of the variables Motivation and the Classroom Learning Environment on black secondary students' Verbal and Mathematics SAT scores. In the regression equation explaining the effect of all the independent variables combined on the dependent variable Verbal SAT scores, the 12 independent variables in combination accounted for 65% (R2=.65) of the variance in the dependent variable. The regression equation explaining the effect of each of the independent variables on the Verbal SAT scores revealed that the motivation variable Academic Self-Concept exerted significant, positive effects on the Verbal SAT scores (Beta=.26, p<.001). Not one of the classroom environment variables suggested significant effects on the Verbal SAT scores. The results of the regression equations are found in Table 2.

In the Regression equation explaining Mathematics SAT scores, the 12 independent variables combined accounted for 63% (R^2=.63) of the variance in the dependent variable. The variable Academic Self-Concept on the motivation instrument showed significant, positive effects on the Mathematics SAT scores (Beta = .20, p<.01). The variable Order and Organization on the classroom environment instrument also indicated significant, positive effects on the Mathematics SAT scores (Beta=.12, p<.01).

The second research question focused on the effects of ability and sex on the group of black secondary students' Verbal and Mathematics SAT scores. The variable Ability indicated a significant, positive effect on the Verbal SAT scores and on the Mathematics SAT scores (Beta =.63, p<.001; Beta =.73, p<.001), respectively. The variable Sex suggested a significant, inverse effect on the Mathematics SAT scores (Beta=-.12, p<.01).

Subsequently, a separate regression equation was performed by regressing Verbal and Mathematics SAT scores by Sex on each of the remaining 11 independent variables.

From the regression equation by sex on the Verbal SAT scores, significant sex differences were found on the motivation variable Social Self-Concept (Beta=.21, $p<.01$) favoring males. Sex differences on several classroom environment variables were found. Sex differences, for example, were shown on the classroom environment variables Involvement favoring females and Rule favoring males (Beta=.45, $p<.05$; Beta=.83, $p<.05$), respectively.

On the Mathematics SAT scores, significant sex differences were indicated on the variables Involvement and Affiliation which favored females (Beta=.70, $p<.05$; Beta=-.58, $p<.05$), respectively. The significant effect of Affiliation, however, was inverse. There were no significant sex differences found on any of the motivation variables for the Mathematics SAT scores. The results of the sex differences found on the Verbal and Mathematics SAT scores are shown in Table 3.

Summary of Results

The present study examined the effects of motivation and the classroom learning environment on a selected group of black students' Verbal and Mathematics SAT scores. The results indicated that the motivation variable Academic Self-Concept had a significant, positive effect on the Verbal and Mathematics SAT scores (Beta = .26, $p<.001$; Beta = .20, $p<.01$), respectively. Not one of the classroom learning environment variables was statistically significant on the Verbal SAT scores. The classroom learning environment variable Order and Organization, however, indicated a significant, positive effect on the Mathematics SAT scores (Beta=.12, $p<.01$).

The present study also examined the effects of the variables Ability and Sex on the black students' Verbal and Mathematics SAT scores. The variable Ability evidenced the stronger significant, positive effect on the Verbal SAT scores and on the Mathematics SAT scores (Beta=.63, $p<.001$; Beta=.73, $p<.001$), respectively. The magnitude of the effect

of the variable Ability, however, was greater on the Verbal SAT scores than on the Mathematics SAT scores. The variable Sex evidenced a significant, inverse effect on the Mathematics SAT scores (Beta=.-12, p<.01). A further analyses by sex indicated significant sex differences on several variables.

On the Verbal SAT scores, significant sex differences were, for example, found on the motivation variable Social Self-Concept in favor of males while not one of the motivation variables favored females on the Verbal SAT scores. Significant sex differences were indicated on the classroom environment variable Rule Clarity for males on the Verbal SAT scores but not for females. The classroom environment variable Involvement, on the other hand, suggested significant sex differences for females on the Verbal SAT scores but not for males.

On the Mathematics SAT scores, significant sex differences were shown for females on two classroom environment variables: (a) Involvement and (b) Affiliation, but the effect of the variable Affiliation was inverse and not in the direction expected. Although the variable Involvement was significant on the Verbal and the Mathematics SAT scores for females, the effect was greater on their Mathematics SAT scores than on their Verbal SAT scores. There were no sex differences found on any of the motivation variables for males nor for females on the Mathematics SAT scores. There were also no significant sex differences indicated in favor of males on the classroom environment variables on the Mathematics SAT scores.

Of the 12 variables examined for significant effects on the Verbal and the Mathematics SAT scores, the variable Ability evidenced the strongest significant, positive effect on the Verbal SAT scores and on the Mathematics SAT scores. The effect of the variable Ability on the Verbal SAT scores (Beta=.63, p<.001), for example, was over twice greater on the Verbal SAT scores than was the effect of the variable Academic Self-Concept (Beta=.26, p<.001) on the Verbal SAT scores. On the Mathematics SAT scores, the effect of the variable Ability (Beta=.73, p<.001) was approximately four times greater

than was the effect of the variable Academic Self-Concept (Beta=.20, p<.01). The effect of the variable Ability (Beta=.73, p<.001) on the Mathematics SAT scores was approximately six times greater than were the effects of the variables Order and Organization and Sex (Beta=.12, p<.01; Beta =-.12, p<.01) on the Mathematics SAT scores.

Overall, the variables Ability and Academic Self-Concept exerted significant, positive effects on the Verbal SAT scores. The variables Ability, Academic Self-Concept, Order and Organization, and Sex indicated significant effects on the Mathematics SAT scores, although the effect of the variable Sex was inverse. In magnitude, the variable Ability evidenced the greatest significant effect on the Mathematics SAT scores (Beta =.73, p<.001) followed by Academic Self-Concept (Beta=.20, p<.01) and by Order and Organization and Sex with effects of similar magnitude (Beta=.12, p<.01; Beta=-.12, p<.01), although the effect of the variable sex was inverse.

Unexpectedly, the motivation variables Achievement Motivation and Emotional Self-Concept were not significant in either of the two equations. Not one of the classroom environment variables was found to be statistically significant on the black students' Verbal SAT scores, except in the analyses for sex differences. The classroom environment variables Task Orientation and Teacher Support were not statistically significant in any of the equations which was also unexpected.

Conclusion and Discussion

The first research question in the present study concentrated on the effects of the variables Motivation and the Classroom Learning Environment on black secondary students' Verbal and Mathematics SAT scores. The results indicated that the motivation variable Academic Self-Concept significantly influenced the Verbal SAT scores while the motivation variable Academic Self-Concept and the classroom learning environment variable Order and Organization had significant effects on the Mathematics SAT scores. The second research question addressed the effects of the variables Ability and Sex on the

Verbal and the Mathematics SAT scores. The findings evidenced that the variable Ability had a significant, positive effect on the Verbal and the Mathematics SAT scores. The variable Sex was found to significantly, inversely influence the Mathematics SAT scores. The variable Ability indicated the strongest significant, positive influence on the Verbal SAT scores and on the Mathematics SAT scores. The findings in the present study are significant in view of the growing concerns over how best to improve black students' Verbal and Mathematics SAT scores.

From an academic prospective, it would appear that black high school students similar to the group in the present study may increase their Verbal and Mathematics SAT scores through implementation of the variables found to have significant, positive effects. The variables Ability and Academic Self-Concept, for example, imply that an improvement in the students' ability and an increase in pride in their school work and in their expectancy to do well in school may increase their Verbal and Mathematics SAT scores. An increase in orderly behavior in the classroom also indicates a potential for increasing the students' Mathematics SAT scores.

Subsequently, the variables in the present study that were found to have positive, significant effects on the Verbal and Mathematics SAT scores have implications for curriculum design. More specifically, the finding of the significant effect of the variable Ability which indicated the greatest significant, positive effect on the Verbal and Mathematics SAT scores suggests that an improvement in this particular group of black students' ability may simultaneously improve their verbal skills in vocabulary, verbal reasoning, and reading comprehension that are assessed on the Verbal component of the SAT. An improvement in the selected group of black students' ability also indicates a similar significant effect for increasing their mathematical skills in problem solving in arithmetic, elementary algebra, and geometry that are included on the Mathematics section of the SAT.

The results of the present study are consistent with those of previous research. A number of researchers, for example, support the theoretical assertions of the potent effect of the variable Ability on verbal and mathematics achievement. A particular researcher (Covington, 1979, 1983, 1984) has held steadfast the proposition that ability establishes the limits for the effects of educational interventions on academic achievement. Several other researchers (Beckman & Good, 1981; Catell, Barton, & Dielman, 1972; Erchul, 1986; Neale, 1969; Webb, 1982) have concluded that ability has a great, significant influence on students' verbal and mathematics achievement. Sternberg (1985) argues that ability, to an extent, is alterable. Based on this assertion, school personnel may focus on the variable Ability both in preventive and remedial interventions. The following suggestions are recommended for improving the particular group of black high school senior students' verbal and mathematics ability:

(1) Administer verbal-ability and mathematical-ability tests at the beginning of the school year and assess the results for weaknesses on verbal and mathematical skills.

(2) Offer necessary interventions for improving the specified weaknesses.

(3) Administer the same verbal- and mathematical- ability tests after the educational interventions and compare the scores before the interventions and after the interventions. More specifically, use the scores from the first administered ability tests on verbal ability and mathematics ability as pretest scores and the scores from the second administered ability tests as the posttest scores. Assess the scores for statistical gains.

(4) Another strategy is to administer a verbal domain-referenced test precisely defined for each verbal skill on the SAT. A domain-referenced test, for example, may be administered on vocabulary ability, on verbal reasoning ability, and one on reading comprehension ability. If mastery on each is not demonstrated, educational interventions consistent with the content areas of the students' overall curriculum may be implemented. The same strategies may be utilized for improvement of ability on mathematics skills, except the information and material would be mathematics rather than verbal. Administer, for example, domain-referenced tests on ability in problem-solving in arithmetic, in elementary Algebra, and in geometry.

Although the present study focused on black students at their senior-level year in high school, black students at lower grade levels are, perhaps, demonstrating similar deficiencies on the verbal skills (vocabulary, verbal reasoning, and reading comprehension)

and on the mathematics skills (problem-solving in arithmetic, elementary algebra, and geometry). With respect to this deductive assumption, assessment of black students' ability on verbal and mathematical skills needs to be initiated long before students' reach their senior year in high school. According to the College Board (1968), the verbal and mathematics skills included on the SAT develop gradually over a period of years and are difficult to improve through brief methods of educational interventions such as coaching during the students' final year of high school.

From the perspective that verbal and mathematics skills are acquired gradually, it may be very beneficial if the following steps are implemented to provide students at lower grade levels an opportunity to acquire competency on the verbal and mathematics skills that are included on the SAT:

(1) Administer ability tests on verbal and mathematics concepts as early as the kindergarten level and provide the needed educational interventions. Statistically evaluate the effectiveness of the educational interventions by administering similar verbal and mathematics ability tests following the interventions. The verbal and mathematics ability tests may be administered, at least, every other grade level thereafter and continuously compared for statistical improvement and followed by the necessary educational interventions. This suggests a somewhat cyclic model of improvement: (a) assessment of ability, (b) educational interventions, (c) statistical evaluation for effectiveness of interventions determined from performance on similar verbal and mathematics ability tests, and (d) more intense educational interventions, if needed.

(2) Encourage students to take the Preliminary Scholastic Aptitude Test (PSAT) at the Grade 10 level and assess their mastery of the verbal and mathematics skills. Provide needed educational interventions for weaknesses identified.

Academic Self-Concept, a subscale of motivation which focused on the extent to which students exhibit pride in their school work and their expectancy to do well in school,

indicated the second most significant, positive effect on the Verbal and the Mathematics SAT scores. The significant, positive effect of the variable Academic self-concept on the students' Verbal and Mathematics SAT scores implies that an increase in the students' pride in their school work and in their expectancy to do well in school may improve their performance on the verbal and mathematical skills on the SAT.

The significant effect that students' pride in their school work and their expectancy of success in school exert on academic achievement is supported by existing literature. Brophy (1983) has suggested that more focus be placed on the value that students place on academic activities. Anderson (1981) questioned students about their seatwork assignments and found that they talked mostly in terms of getting them done and showed little awareness of or interest in the knowledge they were supposed to be developing. The preceding literature (Brophy, 1983) implies that learning in school means seeking to acquire the knowledge or skill that an academic activity is designed to develop, not merely getting the activity finished or performing the minimum necessary to meet requirements. Thus, it is further implied that in increase in students' academic self-concept which increases their pride in school work and their expectancy to do well in school may simultaneously increase their achievement of desire outcomes.

A number of researchers (Ames & Archer, 1988; Eccles, 1983; Harter, 1988) have indicated that students' pride in their school work and their expectancy of success are important to their academic achievement. Wylie (1963) found racial differences on students' perception of their school work. A comparison of black students revealed that black students had lower perceptions of their school work than did their white counterparts. Considering the results of the present study which indicated that academic self-concept significantly influenced the selected group of black students' Verbal and Mathematics SAT scores, school educators may concentrate on strategies for improving the group of black students' pride in their school work and their expectancy of success.

Although large literatures exist on the topic of academic self-concept, relatively little have delineated strategies for increasing students' pride in their school work. Subsequently, several suggestions are offered in the scope of the present study. The suggestions are as follows:

(1) If academic self-concept addresses students' pride in their school work and their expectancy of doing well in school, it seems that students will need to first experience some degree of academic success in their school work. One strategy, for example, may be to allow students to determine the level of difficulty of some of the instructional materials designed for them. To implement this, teachers may provide students a list of application learning activities for desired comprehension of materials and allow each student to chose a learning activity considered comparable to the particular student's level of mastery. This strategy may also enhance students' expectancy of success.

(2) Teachers may help each student to achieve mastery by re-teaching students the objectives not mastered as determined from the results of teacher-made tests and standardized tests. Providing students an opportunity to re-take tests and obtain a higher score may also increase students' pride in their school work.

(3) Teachers may offer praise to students for excellent academic achievement.

(4) Teachers should respect students' viewpoint and build on them to help students feel proud of their contribution.

(5) Cooperative learning may be encouraged rather than competitive learning since competition usually indicates winners and losers. The cooperative learning may still, however, have a reward system in order to recognize high academic achievement but not at the expense of the less academically-abled students.

(6) Teachers may include comments on students' written work of their attributes and strengths that have been assessed from the particular assignment.

(7) Educational interventions may be offered to help students reach desired academic levels at their own pace. This strategy will prevent students from feelings of academic failure.

The regression equations further revealed that the classroom learning environment variable Order and Organization exerted significant, positive effects on the Mathematics SAT scores. This particular finding suggests that an increase in students' orderly behavior and in teachers' organization of class assignments, instructional materials, and the physical environment of the classroom may increase the particular group of students' Mathematics SAT scores. The importance of order and organization in the classroom has been well-established as an essential factor in the learning process and has received attention from several researchers (Everston & Anderson, 1979; Gentry & Kenny, 1965; Kounin, 1970; Wallis, 1973). Other researchers (Everston, Anderson, Anderson, & Brophy, 1980; Havita, 1985; Kurt & Kenny, 1986) have found that the variable Order and Organization significantly increases verbal and mathematics achievement.

Since the variable Order and Organization addresses the extent to which the class is under control with orderly behavior, the finding has implications for staff development, particularly for classroom teachers. The results further suggest a need for teachers to be efficient in classroom management strategies. Subsequently, teachers may be offered workshops on classroom management to acquire a repertoire of managerial strategies for an orderly and organized classroom.

The significant, inverse effect of the variable Sex on the Mathematics SAT scores revealed interesting sex differences on several variables. Sex differences were found for males on the motivation variable Social Self-Concept and on the classroom environment variable Rule Clarity on the Verbal SAT scores. The significant, positive effects of the variable Social Self-Concept and Rule Clarity Verbal SAT scores favoring males imply that pleasing the teachers and being provided clear, well-defined rules with consequences of violating the rules may increase the Verbal SAT scores for males. Significant sex

differences on the Variable Involvement favoring females on the Verbal SAT scores suggests that females active participation and attentiveness in class may increase their Verbal SAT scores. On the Mathematics SAT scores, significant sex differences were revealed on two classroom environment variables: (a) Involvement and (b) Affiliation. The significant effect of the variable Affiliation was in the inverse direction.

The significant, positive effect of the variable Involvement on the Verbal SAT scores for females indicates that active participation and attentiveness in class are promising for increasing black females' Verbal SAT scores. Moreover, active participation and attentiveness imply potentials for increasing black females' Verbal and Mathematics SAT scores. The significant, inverse effect of the variable Affiliation on the Mathematics SAT scores for females, on the other hand, suggests that the extent to which females know, help, and are friendly toward each other may decrease their performance on the Mathematics section of the SAT. Although Walberg and Anderson (1968) point out that classroom intimacy has negative effects on the academic achievement of girls of low ability, the finding in the present study of the inverse effect to the variable Affiliation on females' Mathematics SAT scores is still alarming. The finding, however, warrants further investigation of the effect of affiliation on the Mathematics SAT scores of females, in general. Succinctly, the sex differences found on the Verbal and the Mathematics SAT scores suggest that males and females require different motivation and classroom learning environment variables for performing on the Verbal and Mathematics components of the SAT.

Although several variables have shown significant effects on the Verbal and Mathematics SAT scores, the concentration on predominantly black students may limit the generalizability of the findings to other secondary students. It is also important to acknowledge that the selective sample of students in the present study represent an urban school district and the results, therefore, may not be applicable to black students in rural

areas and in the more affluent suburban school districts. Subsequently, the findings of the present study may be considered within the context of the total experiences of the students.

On the other hand, since there is a lack of data to contradict the significant effects shown by the motivation and classroom environment variables on the Verbal and Mathematics SAT scores in the present study, their inclusion in the school curriculums may be beneficial to black students as they seek to improve their Verbal and Mathematics SAT scores. In fact, the findings indicate that research on variables that may increase black students' Verbal and Mathematics SAT scores is very much needed. Since black students' acquisition of the verbal and mathematics skills assessed on the SAT has not been systematically studied, another issue is indicated for further investigation.

Figure 1

Profile of Schools

SCHOOL	1	2	3	4	5	6
POPULATION	1823	1413	689	1960	1365	1552
LOCATION	URBAN	URBAN	URBAN	URBAN	URBAN	URBAN
% ETHNIC BREAKDOWN	W=2.1 B=79 H=16.6 A=2.3	W=2.6 B=89.6 H=6.0 A=1.8	W=9 B=49.9 H=17.7 A=23.4	W=.5 B=97.3 H=1.2 A=1.0	W=2.5 B=76.5 H=20.6 A=.4	W=5.2 B=87.5 H=6 A=1.4
DISTRIBUTION BY GENDER	M=947 F=876	M=782 F=631	M=212 F=477	M=997 F=963	M=560 F=805	M=846 F=706
DISTRIBUTION BY GRADE	9th=699 10th=400 11th=367 12th=357	9th=547 10th=319 11th=266 12th=281	9th=191 10th=165 11th=159 12th=174	9th=594 10th=478 11th=410 12th=478	9th=489 10th=315 11th=286 12th=275	9th=487 10th=406 11th=362 12th=297
FACULTY DISTRIBUTION	M=38 F-63	M=36 F=50	M=9 F=25	M=50 F=50	M=34 F=48	M=36 F=39
ADMINISTRATORS	4	4	2	6	4	6
% OF STUDENTS THAT GRADUATE	88.1	89.1	97.8	85.7	94.8	86.6
% OF STUDENTS THAT GO ON TO COLLEGE	78	72	95	27	43	50
% OF STUDENTS RECEIVING FREE/ REDUCED LUNCH	F=13 R=2	F=19 R=2	F=6 R=1	F=20 R=2	F=20 R=2	F=18 R=2
% OF STUDENTS CONSIDERED "AT RISK"	11.9	10.9	2.2	14.3	5.2	13.4

Table 1

Means, Standard Deviations, and Intercorrelations Among Variables of the Multidimensional Motivation Instrument, the Classroom Environment Scale, Ability, Sex, Verbal SAT Scores, and Mathematics SAT Scores

Variables	M	SD	2	3	4	5	6	7	8	9	10	11	12
1. Ach Mot	3.42	.87	.76	.77	.42	.40	.14	.48	.51	.41	.52	.31	.35
2. Acad. S-C	3.67	1.09	-	.78	.36	.36	.08	.46	.52	.43	.55	.41	.46
3. Social S-C	3.44	.92	-	-	.41	.32	.09	.44	.49	.39	.53	.33	.33
4. Emot. S-C	3.22	1.38	-	-	-	.09	.03	.14*	.19**	.14	.20**	.10	.15
5. Involve	1.74	.66	-	-	-	-	.07	.56	.65	.62	.55	.15**	.18
6. Affil	2.52	.42	-	-	-	-	-	.23	.12*	.11*	.25	.09	.10
7.Teach Supp	2.06	.65	-	-	-	-	-	-	.62	.60	.64	.28	.30
8. Task-O	2.05	.72	-	-	-	-	-	-	-	.70	.71	.21***	.24
9.	1.78	.61	-	-	-	-	-	-	-	-	.60	.29	.30
10. Rule	2.11	.69	-	-	-	-	-	-	-	-	-	.20***	.21
11. Read Mat6	706.05	41.36	-	-	-	-	-	-	-	-	-	-	.64
12. Math MAT6	697.74	38.30	-	-	-	-	-	-	-	-	-	-	-
13. Sex	1.64	.48	-	-	-	-	-	-	-	-	-	-	-
14. Verbal SAT	360.37	93.72	-	-	-	-	-	-	-	-	-	-	-
15. Math SAT	402.37	97.21	-	-	-	-	-	-	-	-	-	-	-

Table 2

Regression of Motivation, the Classroom Environment, Ability, and Sex Variables on Verbal and Mathematics SAT Scores

Independent Variables	SATV BETA	SATM BETA
Pre-achievement (ability)	.63***	.73***
Sex	.01	-.12**
CLASSROOM ENVIRONMENT SCALE		
Involvement	-.09	.02
Affiliation	.00	.05
Teacher Support	.03	.00
Task Orientation	.09	.12
Order and Organization	.10	.12**
Rule Clarity	.04	.11
MOTIVATION		
Achievement Motivation	.04	.09
Academic Self-Concept	.26***	.20**
Social Self-Concept	.04	.11
Emotional Self-Concept	.01	.02
	R^2 = .65	R^2=.63

*p<.05
**p<.01
***p<.001

Table 3

Regression of Sex on Verbal and Mathematics SAT Scores

	SATV Beta		SATM Beta	
	Males	Females	Males	Females
Pre-achievement ability	.23	.14	.29	.20
Classroom Environment Scale				
Involvement	.09	.45*	.09	.70*
Affiliation	.07	.03	.08	-.58*
Teacher Support	-.05	.04	.04	.04
Task Orientation	.09	.10	.09	.14
Order and Organization	.05	.15	.18	.11
Rule Clarity	.83*	.02	.06	.15
Motivation				
Achievement Motivation	.03	.08	.17	.10
Academic Self-Concept	.07	.06	.23	.13
Social Self-Concept	.21**	.04	.04	.12
Emotional Self-Concept	.11	.04	.03	.07
	R^2=.67	R^2=.70	R^2=.76	R^2=.62

* p<.05
**p<.01
***p<.001

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